3rd Public Workshop to Discuss Development of Regulations for Ocean-going Ship
Main Engines and Auxiliary Boilers

# Proposed Regulatory Language

**September 24, 2007**
**Sacramento, CA**

California Environmental Protection Agency
AIR RESOURCES BOARD

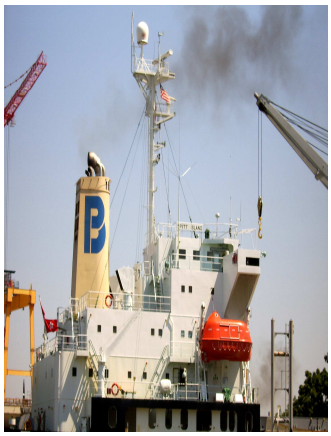
# Overview

- Recap
- Activities Since June Workshop
- Proposed Changes to Draft Regulatory Proposal
- Preliminary Estimates of Emission Reductions
- Next Steps

**Email Questions to auditorium@calepa.ca.gov (during workshop only)**

## Emissions from Ships Impact Public Health and Air Quality

- **Air pollution is a serious public health concern**
- **Marine vessels are a large source of California's NOx & PM emissions**
- **Multiple drivers for action**
- **Number of statewide strategies to reduce emissions from ships**





## Goals for Proposed OGV Main Engine Regulation

- Achieve significant emissions reductions form ocean-going vessels
  - **require use of cleaner fuels as soon as possible**
  - **align regulation with auxiliary engine rule**
- Address Federal District Courts decision on auxiliary engine rule

## Activities Since June Workshop

- Maritime Working Group meeting
- Individual meetings with stakeholders
- Technical investigations
  - further investigation of technical and operational issues associated with changing fuels
  - fuel availability issues
  - operation of boilers on distillate fuels



## Current Findings - Feasibility

- **For most vessels, changing fuel from HFO to distillate in main engine is feasible**
- **There are technical and operational challenges but think can be overcome**
  - **as fuel sulfur level is lowered, technical issues may become more significant**
- **No long-term experience with routinely changing fuels in today's 2-stroke main engines**
- **Some ship operators believe it may be more practical to phase in the lower sulfur fuel**
- **Feasibility dependent on addressing technical and operational issues**

## Current Findings – Feasibility Dependent Technical and Operational Issues

- Fuel properties
  - **viscosity**
  - **sulfur content**
  - **lubricity**
  - **compatibility**
  - **flash point**
- Main engine cylinder lubricant
  - **type and feed rate**
- Vessel and fuel system design
  - **age, maintenance and tankage**
- Crew training and well-documented procedures



## Current Findings Fuel Availability

- **MGO or MDO available at most all fueling ports**
- **MGO at O.10% S not currently available at key fueling ports**
  - **more prevalent in North American ports**
  - **not readily available in many Asian ports**
    - **fuel supply infrastructure and fuel stream not in place**
    - **in some cases, fuel can be provided with enough lead time**

## Current Findings- Fuel Availability

- **Expect availability of 0.10% S MGO to increase in future years**
  - **increased supply due to demand for clean landside fuels**
  - **market forces will help but CA ship trade volume small**
  - **EU Directive for use at berth**
  - **indications that fuel suppliers are preparing for future demands**
    - **offshore bunkering becoming more prevalent**
    - **increased landbased tankage**
  - **likely that there will always be some ports where the 0.10% S fuel is not available**
- **Makes sense to allow purchase of fuel in CA if can't get at last port**
- **Additional data necessary to better address fuel availability questions**



## Current Findings – Boilers & Regulation Development Timing

- Feasible to use distillate in auxiliary boilers
- ARB staff need more time to put the regulatory package together and obtain stakeholder input
  - further evaluation of operational issues
  - complete fuel availability study
  - address legal issues/align auxiliary regulation

## Proposed Changes to Draft Regulatory Proposal



*Draft Regulatory Language*

## OGV Main Engine Draft Regulatory Proposal

- Applicability
- Exemptions
- Definitions
- In-use operational requirements
- Non-compliance fee
- ACE
- Recordkeeping

*Draft Regulatory Language*

## Key Changes

- Extended requirements to auxiliary boilers
- Added exemption for temporary use of noncompliant fuel in experimental trials
- Evaluating two approaches to fuel sulfur limit
  - **One step or two step implementation timeframe and fuel sulfur limit**
- Removed ACE
- Added provision for purchasing compliant fuel in California
- Removed fuel availability evaluation requirement



*Draft Regulatory Language*

## Applicability

- All ocean-going vessels (U.S. and Foreign-flagged, excludes OGV tugs)
- Main engine on OGVs designed primarily to provide propulsion
- *Auxiliary boilers on OGVs designed to produce steam for uses other than propulsion*
- All vessels operating within 24 nautical miles of the California coast

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## Inclusion of Auxiliary Boilers in Proposed Regulation will Reduce Emissions of PM and SOx

- Significant source of emissions – mostly at dockside or close to shore
- Large potential reductions in PM & SOx
- Practical to include boilers in main engine rule rather than separate rule
- Presentation to follow on feasibility of including auxiliary boilers



*Draft Regulatory Language*

## Exemptions

- *Added a temporary experimental research exemption*
  - *– research purposes only*
  - *– limited for up to a year*
- Other exemptions have not changed significantly in latest proposal
- Most exemptions are aligned with the auxiliary engine fuel rule

*Draft Regulatory Language*

## Definitions

- *"Auxiliary Boiler" definition added*
- Other definitions have not changed significantly in latest proposal
- Most definitions are aligned with the auxiliary engine fuel rule



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## Fuel Requirements and Implementation Dates

- ARB staff requesting comment on two potential approaches for fuel sulfur limits and implementation timing
  - *Approach A1: one step implementation with one fuel sulfur limit*
  - *Approach A2: two step implementation process with a phase in of lower sulfur fuel requirement*

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## Approach A1

- *January 1, 2010 In-Use Requirement*
  - *use MGO with a 0.10% sulfur limit*
  - *main engines*
  - *auxiliary boilers*



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## Approach A2

- *January 1, 2009 In-Use Requirement*
  - *use MGO or MDO (0.50% sulfur limit )*
  - *main engines*
  - *auxiliary boilers*
- *January 1, 2012 In-Use Requirement*
  - *use MGO with a 0.10% sulfur limit*
  - *main engines*
  - *auxiliary boilers*

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# Approach A1

*PROS*

- **Aligns with 0.10% sulfur requirement in 2010 for auxiliary engines**
- **Fuel sulfur limit and timing consistent with EU Directive for use at berth**
- **Consistent with recent proposals by EPA**

*CONS*

- **Fuel availability issues**
- **Limits vessel operators opportunity to work through two significant operational challenges independently**
  - **HFO to distillate**
  - **distillate to <0.10% S distillate**
- **Does not provide more reductions in 2009-2020 timeframe**



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# Approach A2

*PROS*

- **Greater emissions reductions sooner, greater total (2009-2012)**
- **MGO and MDO currently available at most ports world wide**
- **Many vessel operators believe a two step approach is more feasible**
- **Allows fuel delivery industry added time to address availability and infrastructure for 0.10% S distillate**
- **Actual average fuel sulfur level of distillates significantly lower than expected**

*CONS*

- **Will require amendment to auxiliary engine rule**
- **Initial fuel sulfur level and timing not consistent with EU Directive for use at berth and recent proposals by EPA**
- **Fuel availability may still be an issue in 2012 for 0.10% sulfur distillate**

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## Option to Pay Noncompliance Fee

- Reasons beyond vessel Master's control
  - **unexpected redirection to a California port**
  - **inability to purchase complying fuel**
  - **fuel found to be noncompliant enroute to California**
  - ***provision to purchase fuel in California***
- Extension needed for vessel modifications
- Vessel modifications needed on infrequent visitor



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## Added Option to Purchase Compliant Fuel in CA

- ***Added a provision to waive fee in circumstances beyond master's control***
  - ***requirements of this provision will depend on approach***
  - ***one time per calendar year ending [Dec. 31, 2012 or 2014]***
  - ***if compliant fuel is purchased and compliance begins at first port after entering Regulated California Waters***
  - ***may consider requiring MGO or MDO (capped 0.5% S) during noncompliant portion of voyage***

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## Alternative Control of Emissions and Recordkeeping

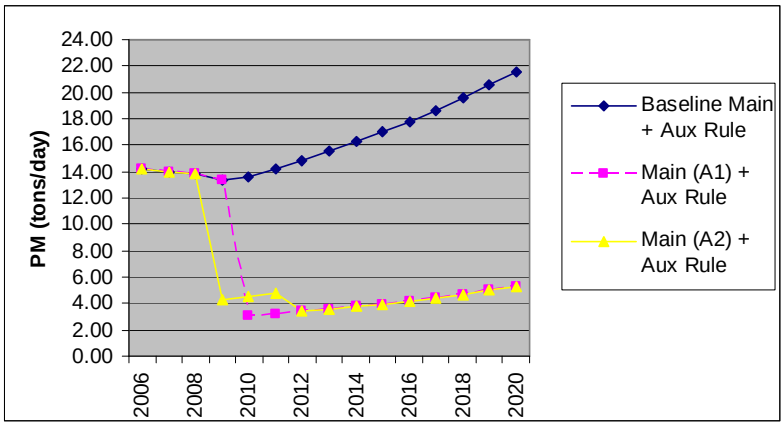
- *Removed Alternative Control of Emissions (ACE) provision*
  - ***address Judge's ruling***
- Recordkeeping requirement have not changed in the latest proposal



## Preliminary Estimates of Emission Reductions

*Preliminary Estimates of Emissions Reductions*

## PM Emissions for Main Engine by S% (Includes Auxiliary Rule)




Note: A1 is Approach A1, A2 is Approach A2
Main Rule includes main engine and auxiliary boiler
24 NM Boundary



*Preliminary Estimates of Emissions Reductions*

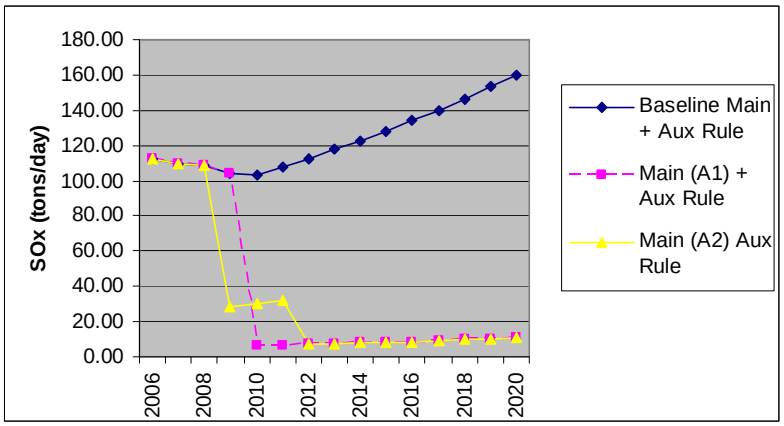
## PM Emissions for Main Engine by S% (Includes Auxiliary Rule)

| PM Emission Reduced | 2009-2011 | 2012-2020 | Total Reduced (2009-2020) |
|---|---|---|---|
| | tons | tons | tons |
| Approach A1 | 23,500 | 135,000 | 158,500 |
| Approach A2 | 30,000 | 135,000 | 165,000 |

24 NM Boundary

*Preliminary Estimates of Emissions Reductions*

## SOx Emissions for Main Engine by S% (Includes Auxiliary Rule)




Note: A1 is Approach A1, A2 is Approach A2
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*Preliminary Estimates of Emissions Reductions*

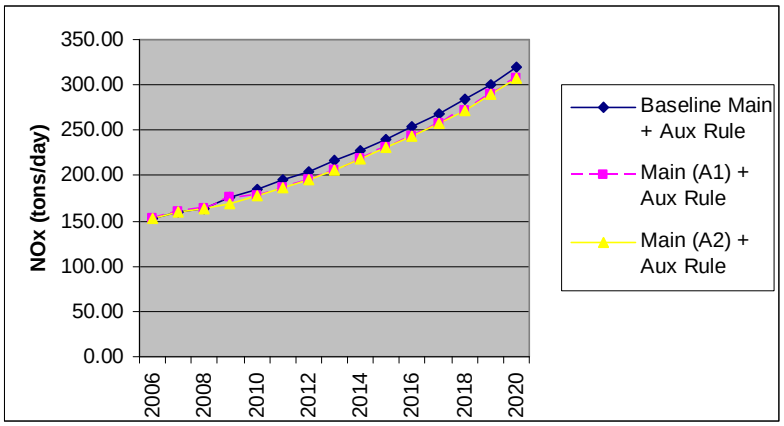
## SOx Emissions for Main Engine by S% (Includes Auxiliary Rule)

| SOx Emission Reduced | 2009-2011 | 2012-2020 | Total Reduced (2009-2020) |
|---|---|---|---|
| | tons | tons | tons |
| Approach A1 | 217,000 | 3,734,000 | 3,951,000 |
| Approach A2 | 246,200 | 3,734,100 | 3,980,300 |

24 NM Boundary

***Preliminary Estimates of Emissions Reductions***

## NOx Emissions for Main Engine by S% (Includes Auxiliary Rule)

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Main Rule includes main engine and auxiliary boiler
24 NM Boundary



***Preliminary Estimates of Emissions Reductions***

## NOx Emissions for Main Engine by S% (Includes Auxiliary Rule)

| NOx Emission Reduced | 2009-2011 | 2012-2020 | Total Reduced (2009-2020) |
|---|---|---|---|
| | tons | tons | tons |
| Approach A1 | 17,900 | 102,600 | 120,500 |
| Approach A2 | 26,200 | 102,600 | 128,800 |

24 NM Boundary

## Next Steps



## Next Steps

- Continue technical discussions with stakeholders
- Analyze and present data from survey
- Continue to investigate the impacts of changing fuels
- Continue to investigate fuel availability and cost impacts
- Board consideration – April 2008

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**http://www.arb.ca.gov/marine**



## Discussion Topics

- Are there instances where a temporary research exemption may be longer than one year?
- What are the advantages/disadvantages for the two different approaches (one step and two step phase in)?
- Are there ship operational issues with purchasing compliant fuel in CA and changing at first port visit?